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Commentary

A Study on the Assessment of Rainfall and Water Vapour over Tropics

Charlene Detelich*

Department of Geological Sciences, University of Alaska Anchorage, Alaska, USA

DESCRIPTION

Understanding the earth's hydrological cycle infers the sources and sinks of fresh water, which is indispensable for life on earth in its present form and influences virtually every aspect of our planets life support system. The fresh water sources are becoming diminished under warming climate scenario and governed by the renewal processes associated with global hydrological cycle. Many atmospheric processes, such as atmospheric circulation and global precipitation, are primarily driven by fundamental mechanisms exhibited by hydrological cycle. The hydrological cycle is composed of several components. Precipitation and water vapor are two basic and important components of hydrological cycle. A good deal of effort has been put towards exploring and comprehensive understanding of the physical mechanisms governing these basic atmospheric processes.

Precipitation is a major component of the water (Hydrological) cycle, and is responsible for most of the fresh water on the planet and one of important natural element that has the potential to influence the economy of the country. The impact is more so on agrarian-based countries, like India. Therefore, continuous monitoring of precipitation at various temporal and spatial scales is extremely important. Further, the timely dissemination of precipitation information to administrators is also most crucial for taking necessary action and to mitigate the damage due to extreme rainfall events, like flash floods and cyclones. The amount of latent heat released during condensation of water vapour (an important process involved during cloud formation) is the primary source for driving the global winds and weather systems in the atmosphere.

Similar to precipitation, water vapour also plays a vital role in hydrological cycle, earth's radiative budget and in altering the climate trends. The quantification of atmospheric water vapour is essential to reckon its functional mechanism in hydrological cycle and to understand its feedback to climate change. Water vapour is one of the important greenhouse gasses in the atmosphere, it regulates partially earth's atmosphere energy budget through trapping outgoing long wave radiation. Better understanding of the role of water vapour and its feedback (positive feedback as warming atmosphere can hold more. Water vapour or negative feedback due to the formation of clouds that reflect a fraction of insolation and allow less energy to reach the earth's surface) is essential. Recent results show that the water vapour feedback can also amplify the warming effect of the other greenhouse gases, such as the warming caused by carbon dioxide.

CONCLUSION

A variety of instruments/techniques are now available for the measurement of rainfall, the liquid form of precipitation. Some of these techniques/instruments measure the rainfall directly and some of them retrieve rainfall from other measurements. Rain gauge is one of the widely used and well accepted standard instruments to measure the rainfall by world meteorology community. Though gauges directly measure the rainfall, but their existing networks are inadequate to capture the space-time variability of rainfall. A very dense network of gauges covering the whole world is required for that purpose. Establishing such a network is neither economical nor practical. The remote measurement of precipitation is becoming increasingly popular as such measurements provide rainfall information over a large area with high resolution. The Doppler Weather Radars (DWRs) that provide such information are being networked in most of the countries. Although DWRs are superior to the gauges because of their capability in providing rainfall over a large region, they retrieve rainfall through indirect means from the measured radar reflectivity and therefore contain several errors.

Correspondence to: Charlene Detelich, Department of Geological Sciences, University of Alaska Anchorage, Alaska, USA, E-mail: charlene.d@alaska.edu

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